Abstract

Title: Brain activity assessment using sLORETA during modulated and physical activity.

Objectives: The aim of this thesis was to compare changes in the electrical activity of cortical and deep brain structures using sLORETA program between the resting state, active movement and passive observation of identical motion performed by the author of this thesis and the same one shown in the video.

Methods: In this research participated 12 university students (8 women, 4 men). Age of subjects was between 23 and 25 years. The whole experiment consisted of five parts: 1. electroencephalography in supinated lying position with opened eyes, 2. watching a video, where the selected movement was performed by a woman, 3. watching a video, where this movement was performed by a man, 4. watching the author performing the same movement, 5. performing this movement by subjects themselves. Each of this parts lasted two minutes. The tested movement was 1. diagonal (flexion and extension pattern) of PNF method for right upper extremity. During the whole experiment was registered electric activity of the brain using a scalp EEG. Obtained EEG signal was afterwards exported to sLORETA program, which enabled us to see the collected data in 3D Talairach system and also to make a statistical assessment using a Student´s t-test. We compared data from active movement with data from EEG in lying position. Then there were compared data from active movement with data from observing the same movement performed by the author of this thesis. Finally we compared data collected from watching a video, where the movement is performed by a woman, with a video, where the same movement is performed by a man.

Results: The results showed statistically significant difference in activation brain areas between the EEG activity during the movement performing and resting EEG activity before movement to the level of statistical significance of $p \leq 0.01$ at the frequency zone alpha-1, beta-3 and theta. Between the active movement and observing the same movement there was no statistically significant activation of brain areas. Similarly, there was no statistically significant difference during observing a video with woman and man carrying out a chosen movement.

Keywords: EEG, frequency zones, sLORETA, mirror neurons, Brodmann's areas